



Beef Roundup

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COOPERATIVE EXTENSION

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Editors Note: In preparation for the upcoming Beef Health Symposium: Managing Bull Reproductive Health, I am including this article from the Cattle Producer's Library. This information will be explored in more depth at the symposium. J. Sullins

Identifying the Functional Bull: Bull Soundness and Management

2nd Edition Cow-Calf Management Guide
Cattle Producers Library

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Evaluating breeding soundness of bulls is often neglected as a management practice. Producers may tend to believe that bulls in the bull battery for a year or more are of sound breeding value for the rest of their life. They may also feel that new bulls are sound breeders simply because of some vague or implied guarantee by the seller to replace infertile bulls. Unfortunately, neither idea may be correct. Bulls that do not settle their share of cows early in the breeding season are contributing to reproductive inefficiency. This can be just as costly as dead calves, although much less dramatic.

Bulls are selected for their genetic potential to improve the cow herd. It is economically important that all bulls are fertile. A breeding soundness examination performed yearly on each bull is the best way to predict that the producer will get his money's worth from his bull battery.

A basic breeding soundness evaluation consists of:

- Physical examination of the animal.
- Examination of reproductive organs.
- Measurement of scrotal size.
- Semen evaluation.

In addition, the following tests or procedures may be included in a breeding soundness evaluation:

- Trichomoniasis testing.
- Mating ability: Some assessment of the bull's desire (libido) and ability to breed a female in heat (termed serving capacity).

Classification of Breeding Bulls

The Society of Theriogenology developed a system to evaluate breeding ability of bulls in 1976. This system has become the standard by which bulls are measured for breeding soundness. In 1992 the system was modified slightly to reflect the most current concepts in bull fertility examination (Table 1). To be classified a *Satisfactory Potential Breeder* requires a satisfactory physical examination and minimum values for scrotal circumference, sperm cell concentration, motility, and morphology. Any bull not meeting minimum is classified either as *Unsatisfactory Potential Breeder*, or classification may be *Deferred* at the evaluator's discretion. This scoring system has become the standard across the country and is used by almost all veterinary practitioners.

Physical Examination

The bull needs to be able to see, eat, smell, and move around to successfully breed his share of cows. Any factor that lowers the efficiency of these activities will have a negative effect on the bull's breeding ability. A history of recent illness is also important since the semen sample may show

evidence of testicular damage from a fever for several months after the illness.

Eyes. A bull with poor vision is not only dangerous to handle but is usually dominated by other bulls to the point that his breeding effectiveness is reduced. Both eyes should be free from injuries or disease. Special care should be taken to examine eyes for early cancer eye growths. Old pink eye scars that result in loss of vision may be reason to cull some bulls, especially in multiple sire groups.

Teeth and Mouth. Older bulls need to be examined for lost and severely worn teeth. Lump jaw (Actinomycosis) is a chronic bone and soft tissue infection that is not responsive to treatment. This type of infection is much more serious than the simple “cheatgrass” type abscesses that drain and then completely heal up. Bulls with Actinomycosis should be culled as soon as the condition is diagnosed.

Body Condition. Ranchers often disagree about what is the correct body condition for a breeding bull. Bulls should have enough condition to be strong with some reserves of energy in the form of fat. The required amount of condition will vary with age, kind of range, length of the breeding season, and the number of cows per bull. A body condition score of 7 is desirable for range bulls entering the breeding season.

Feet and Legs. Structural soundness of the feet and legs is paramount if the bull is to travel and mount females in heat. A bull that is either sore or crippled will not be able to perform under range conditions.

Structural defects of the feet and legs should be discriminated against during the breeding soundness evaluation. Some young bulls may have been foundered to some degree in their growing phase. The foundered condition may be fully expressed during the breeding season, causing the bull to go lame and reducing his effectiveness to travel and breed. Do not purchase foundered young bulls.

Most ranchers would not turn out a crippled bull. Conformational faults, stifling, or other injuries can result in the bull going lame soon after the breeding season begins.

Most structural faults such as sickle-hock and postlegs are heritable and may cause lameness with hard use. All four legs and all joints should be clean and free from any swelling or evidence of old injuries. A bull traveling on rough, hard ground will wear his hoofs off even and seldom will have foot problems if he is structurally correct.

Diseases of the foot including foot rot (foul foot), interdigital corns, and puncture wounds should be observed and treated to render the bull sound before the breeding season.

Examining the Reproductive Organs

A thorough examination of the bull’s reproductive system follows the general health examination. The internal organs are examined by rectal palpation while the bull is adequately restrained in some type of chute. The vesicular glands, ampullae, and prostate are examined for evidence of inflammation, adhesions, or fibrosis.

The spermatic cord, scrotum, testicles, and epididymides are examined for evidence of abscess, injury, frost bite damage, or tumors. The testicles are the factory where sperm cells are produced, and they should be firm, resilient, equal in size, and adequate to large for the bull’s age. Degenerative change in any of these organs is a frequent cause of reduced fertility.

Testicular hypoplasia (underdevelopment) is also evaluated at this time. Hypoplasia reduces fertility and is highly heritable. With this condition one or both testicles are one-third of normal size.

The penis and sheath should be examined for any sores, lacerations, abscesses, scar tissue, or adhesions. On erection with the electro-ejaculator, the penis should come from the sheath in a straight line with the body of the bull. Persistent penile

frenulum (tied back penis) is occasionally found during this part of the examination.

Injuries to the penis usually occur during the active breeding season, but may be resolved enough to be missed until the breeding soundness exam. Old lacerations and adhesions usually prevent the penis from being fully extended or cause pain during breeding. Bulls with any type of painful lesion will usually quit trying to breed cows. Warts on the tip of the penis are a relatively common finding in young bulls.

Scrotal Circumference

There is no accurate, repeatable method of measuring actual semen quantity or production with samples collected with the electro-ejaculator. Because scrotal size correlates well with daily sperm production and is highly repeatable, scrotal circumference is a valuable indicator of semen production. Bulls with bigger testicles produce more semen and sire sons with bigger testicles. Bulls with larger testicles will reach puberty at an earlier age and will sire heifers that reach puberty at an earlier age also.

Zebu cattle (*Bos indicus*) tend to have small testicle size for age compared to *Bos taurus* breeds. This smaller testicle size also correlates with the late onset of puberty found in these cattle. Many of the newer beef breeds contain a certain percentage of Zebu blood. Because most of the bulls in these newer breeds possess testicles at least as large as the average *Bos taurus* breeds, the breeding soundness evaluation system used by most veterinarians does not make allowances for smaller testicle size in these breeds.

Scrotal circumference is given a score based on the age of the bull. Scrotal circumference score represents 40 percent of the total score of the bull (Table 1).

Semen Quality Evaluation

A semen sample is usually collected from beef bulls by electro-ejaculation under normal field conditions. The quality of semen obtained with the electro-ejaculator is equal to that of any other collection method.

However, a semen sample adequate for evaluation cannot always be collected from every bull on every attempt with an electro-ejaculator. Failure to obtain sperm cells from a single attempt does not automatically place the bull in the unsatisfactory category.

A bull can be normal on general physical and reproductive organ examination and still have low fertility due to poor semen quality.

If the bull is satisfactory on general physical exam and a complete exam of internal and external reproductive organs, a semen sample is collected and evaluated under the microscope for the following traits:

Concentration (the number of normal sperm cells present in each cc of the ejaculate) and volume (the number of cc's of ejaculate) are important factors in semen quality. Together, these values represent total sperm output or the serving capacity of the bull.

Motility of individual sperm cells is an important factor in determining the breeding soundness of bulls. Ideally, the sample should contain more than 90 percent vigorous, progressively motile sperm cells when diluted and viewed under the microscope. Motility is easily decreased by exposing the semen sample to cold temperature shock during collection in severe weather conditions. Special heated equipment must be used during cold weather if the test is to be meaningful. Motility score represents 20 percent of the total breeding soundness score.

Morphology, or the shape of the sperm cells, is also an important semen characteristic. A small sample of semen is stained on a microscope slide,

and at least 100 cells are graded for normal shape. Sperm cells with droplets, bent or coiled tails, misshapen heads, or other defects will not settle a cow. Abnormal cells should usually be less than 25 percent of the total for a bull to receive the full points in this category. Morphology score represents 40 percent of the total breeding soundness score.

Table 1. Bull breeding soundness evaluation.

Scrotal circumference	
Age of bull	Minimum scrotal circumference
less than 15 months	30 cm
15 through 18 months	31 cm
19 through 21 months	32 cm
22 through 24 months	33 cm
greater than 24 months	34 cm

Motility-Minimum is 30% Fair (F)

Gross activity or	Individual	Rating
Rapid swirling	70%	Very good (VG)
Slower swirling	50 to 69%	Good (G)
Generalized oscillation	30 to 49%	Fair (F)
Sporadic oscillation	< 30%	Poor (P)

Morphology-Minimum is 70% normal sperm cells

NOTE: It is common for yearling bulls, due to immaturity, to require a second fertility examination to achieve *Satisfactory Potential Breeder* status.

Mating Ability

No practical way is now known to estimate a bull's potential mating ability except to observe the bull with cows in heat. Semen production, scrotal size, or hormone levels do not relate well to the mating performance of the bull. Contrary to popular opinion, there does not seem to be any good visual indicator of bull fertility or libido.

In one study reported from Texas A&M University, 40 yearling to 2-year-old bulls were given a masculinity score from 1 (very feminine) to 10 (very masculine). In addition, the size of the crest of each bull was measured. Bulls covered the range of masculinity scores, and a great deal of variation was noted in crest size (from almost none to very large).

No relationships, however, were observed between these measures and either classification after the breeding soundness evaluation or mating behavior.

Libido, or sex drive, is important in the bull's ability to settle a large number of cows. Assessment of libido and mating ability is important because it can help to detect physical abnormalities that would prevent a bull with good semen from settling cows. Information is lacking on breed difference in mating behavior of bulls in natural breeding service. Libido and semen production do not appear to have any relationship, so it is possible to get good semen from low libido bulls and vice versa. Standardized libido testing procedures using heifers in standing heat are described and are quite accurate, but the cost of such tests may preclude their routine use in the breeding soundness examination.

Trichomoniasis Testing

Trichomoniasis, a venereal disease, can be responsible for poor reproductive performance in a cow herd. This disease causes cows to abort within the first 4 months of pregnancy. If the bulls have been pulled after a short breeding season, these cows will be open at pregnancy test time. However, cows will usually clear up and breed back during a prolonged breeding season, producing a delayed calving season and strung-out calf crop.

In many range cattle communities, trichomoniasis outbreaks are a major concern to ranchers. An awareness and vigilance to trichomoniasis are certainly encouraged on the part of all beef producers.

Trichomoniasis is caused by a one-celled protozoan that is found in the sheath of bulls and reproductive tracts of cows. It kills the embryo, which is then expelled by the cow. The cow generally cycles two or three times and then becomes fertile again. This immunity will last about 1 year. However, most bulls over 3 years old never clear up once they become infected. These mature bulls carry the disease until the next breeding season, and can infect several susceptible cows. In a few cases, a

cow can remain a carrier, but the overwhelming majority of carriers are bulls.

The disease is most devastating in bulls 4 years old and over because they are considered infected for the rest of their lives. Younger bulls can become temporarily infected and perhaps spread the disease for a short time. The trichomoniasis organism grows best where there is no air, and lives in the little "pockets" or crypts that line the sheath. The higher infection rate in older bulls can probably be attributed to the fact these older bulls have more crypts where the organisms can survive for long periods of time. As a result, these bulls can start infecting cows at the beginning of the breeding season. They greatly increase the chance of large numbers of cows becoming exposed to the disease.

Producers need to have all breeding bulls tested annually for trichomoniasis. The veterinarian will collect some mucus from the deepest portion of the sheath and culture this material to allow the trichomonads organisms to grow. The culture is observed for 3 to 7 days for any live trichomonads. Bulls testing positive should be culled and sold without question. Bulls testing negative should be retested at a later date, particularly if the veterinarian suspects trichomoniasis as a cause related to breeding problems in the herd.

The accuracy rate for a single sample properly collected and examined is 85 percent. This means that out of 100 positive bulls tested, 85 will show up on the first test as positive. For this reason, retesting is required to eliminate the disease from a bull battery. Bulls should be tested for trichomoniasis well ahead of the breeding season to allow time to replace infected animals. Remember that without proper management of the cow herd, testing and removal of infected bulls will not completely eliminate the problem.

Controlling trichomoniasis in range areas can be difficult and must be a cooperative effort among producers because of the likelihood of herds

commingling with each other. Consequently, even though a producer may eliminate the problem in his herd, his animals are likely to become infected by another producer's infected bulls.

Summary

Breeding soundness evaluation is a practical method to eliminate bulls with less than satisfactory breeding potential. This evaluation should be conducted on every bull 30 to 60 days before each breeding season to allow time to replace questionable or unsatisfactory bulls: Producers should also observe bulls with cows in heat to determine that they have the desire and ability to mate successfully. Pelvic measurement allows selection of bulls with a large pelvic area for their size or age. Bulls should be free of venereal diseases, the most important being trichomoniasis.

Web Site Information

Web sites to add to your list:

For information and research:

<http://ag.arizona.edu/OALS/agnic/science.html>

Rangeland Science: General

For county departments and contacts:

<http://www.co.tulare.ca.us/>

The official Tulare County, California, Web site

For examples of the feasible future of ag sales:

<http://www.cattlesale.com/index.cfm>

Cattle Sales 21st Century

<http://www.horsepower.com/>

A new Ag sales site.

<http://www.theagzone.com/>

A new ag sales site

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